



New interesting records of the genus *Entoloma* from southern and insular Greece



E. Polemis¹, V. Fryssouli¹, M. Noordeloos², B. Dima³, M. Gkilas⁴, L. Kottis⁴ and G.I. Zervakis^{1,*}

¹Agricultural University of Athens, Laboratory of General and Agricultural Microbiology, Iera Odos 75, 11855 Athens (*zervakis@aua.gr)

²Naturalis Biodiversity Center, Leiden, the Netherlands

³Department of Plant Anatomy, Institute of Biology, Eötvös Loránd University, Budapest, Hungary

⁴Adimantou 40, 20100, Korinthos, Greece

⁵Naoussa, 84400 Paros, Greece

Introduction

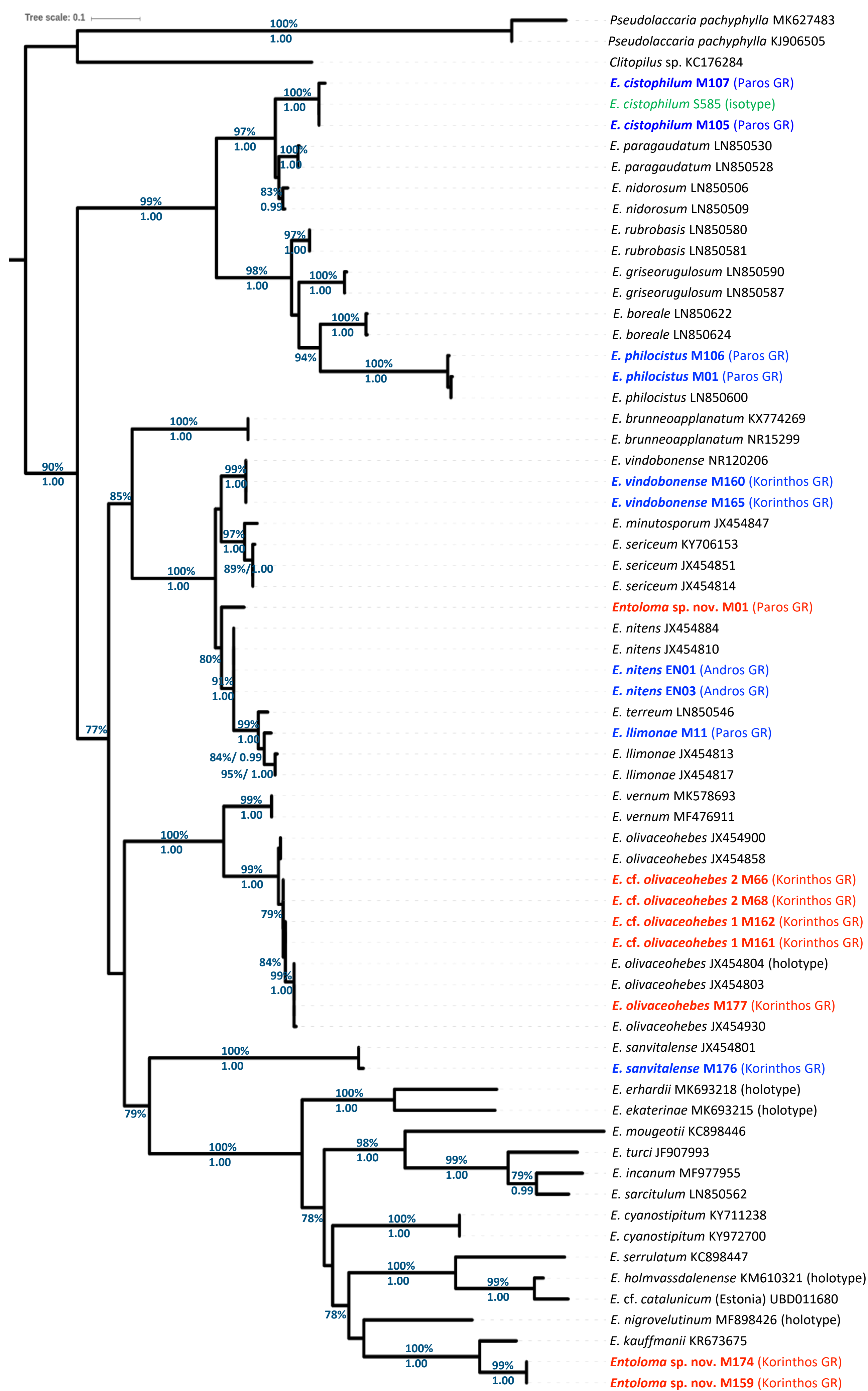
Entoloma is a highly species-rich genus of the order Agaricales (Fungi, Basidiomycota) and accurate determination of species by delimiting intraspecific from interspecific morphological variation is often very difficult. Pertinent research in the western Mediterranean as well as in the islands of Kiklades (Aegean Archipelagos) in Greece led to the description of several species new to science (Noordeloos 2004, Noordeloos & Polemis 2008); still, this genus remains poorly surveyed and inadequately studied in typical Mediterranean habitats located at the eastern part of the Basin.

Material & Methods

Fungal specimens were collected in the mountains of Korinthos (NE Peloponnese) and the islands of Andros and Paros in South Aegean, from thermophilous *Pinus halepensis* forests, and arid scrublands dominated by *Cistus* spp., respectively. Species identification was achieved by combining morphological examination of both fresh material and exsiccatae, ecological features, followed by phylogenetic analyses of rDNA sequences (ITS1-5.8S-ITS2) using Maximum Likelihood (ML) and Bayesian strategies. Taxonomy and terminology is in accordance to Noordeloos (1992, 2004). All exsiccatae are deposited in AUA-ACAM Fungarium and in the authors' personal collections.

Outcome

- ✓ Three new thermophilous *Entoloma* species for Greece were recorded in arid pine forests of Korinthos: (i) *E. sanvitalense*, a rare Mediterranean species described from Spain with heterodiametrical and prominently angled spores, absence of cystidia and pileipellis a cutis to trichoderm with inflated terminal elements and incrusting pigment; (ii) The uncommon *E. olivaceohebes* described from S Italy resembles *E. hebes* from which it differs in the olivaceous tinges of pileus, the heterogenous lamellae edge with scattered cheilocystidia and the subisodiametrical spores; (iii) *E. vindobonense*, which was described from xerophytic grasslands of Austria, and it is characterized by isodiametrical to subheterodiametrical spores, absence of cystidia and pileipellis a poorly differentiated cutis of narrow hyphae with coarsely incrusting pigment.
- ✓ Three typical cistophilous species known to date predominantly from western Mediterranean countries were recorded in the island of Paros: (i) *E. cistophilum* is a widely distributed Mediterranean species with characteristic cuboid to 5-angled spores; (ii) *E. philocistus* known from the Iberian Peninsula and its unique habitat; (iii) *E. llimonae* is a recently described species from Spain (Villa et al. 2013), and it is characterized by isodiametrical to subheterodiametrical spores with many and weak angles, clamped basidia and pileipellis with prominent incrusting pigment. The presence of *E. nitens* was also recorded in association with *Cistus* from Andros.
- ✓ One collection from Paros (M01) is phylogenetically distinct, suggesting an undescribed species which is related to *E. nitens*. The sequences of two collections from Korinthos (M174, M159) are distant from the closest species, i.e. *E. kauffmanii*, and they most likely represent a new species within the subgenus *Cyanula*. In addition, the analysis of the *E. olivaceohebes* complex showed that four Greek collections are phylogenetically distinct from the type.



Phylogenetic tree constructed by ML analysis including rDNA ITS sequences generated in this work (BS₂≥70% and BPP₂≥0.95). Greek specimens of confirmed identity appear in blue while those of unconfirmed identity appear in red.



Bars: 10 μm (spores and basidia/cystidia), 20 μm (pileipellis)

References

- Noordeloos, M.E. 1992. *Entoloma* s.l. in Fungi Europei, vol. 5. Ed. Biella, Saronno.
- Noordeloos, M.E. 2004. *Entoloma* s.l. in Fungi Europei, Supplemento. Vol. 5A. Ed. Candusso.
- Noordeloos, M.E., Polemis, E. 2008. Studies in the genus *Entoloma* (Basidiomycota, Agaricales) from the Kiklades (C. Aegean, Greece). Mycotaxon 105: 301-312.
- Vila, J., Carbó, J., Caballero, F., Català, S., Llimona, X., Noordeloos, M.E. 2013. A first approach to the study of the genus *Entoloma* subgenus *Nolanea* s.l. using molecular and morphological data. Fungi non Delineati. 66:3 and 93-62 and 134.

Acknowledgments

This study was partly funded by the Non-Profit Organization "Hellenic Mushroom Society". E. Polemis was financially supported by the IKY Scholarships Programme, which is co-financed by the European Union (European Social Fund - ESF) and Greek national funds through the Action titled "Reinforcement of Postdoctoral Researchers" in the framework of the Operational Programme "Human Resources Development Program, Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) 2014 - 2020.

